to provide context. Claims 10 and 30 have been cancelled without prejudice and rewritten in independent form as new claims 66 and 67, respectively. Claims 11 and 31, formerly dependent on claims 10 and 30, have been amended to depend from claims 66 and 67, respectively. Claims 44-46 were previously cancelled. Claims 1-10, 12-29, 31-43 and 47-67 are presently pending.

The Present Invention

The present invention relates generally to the manipulation of fluids and reaction vessels for improved universal fluid exchange, and, more specifically to methods and systems for delivery of fluids to and evacuation of fluids from a plurality of reaction vessels so that a plurality of locations are able to work at the same time. This is particularly advantageous for combinatorial chemical synthesis where a great deal of manipulation of large numbers of samples is often required. Other aspects of the present invention address the provision of individually controlled heating and storing of the contents of the plurality of reaction vessels.

As illustrated in Fig. 4, for example, and as presently claimed in claims 1, 23, and 47, a plurality of reaction vessels 10 are supported by upper and lower carousel plates 62 and 64. The plurality of reaction vessels can then be rotated into alignment with the injection and evacuation ports 20 and 22. As discussed in detail at page 10, line 19 through page 12, line 2, liquid may be delivered to and evacuated from any vessel in any sequence desired, under program control. Multiple vessels can be worked on at the same time without the need for a large number of valves to route fluids to a large number of different destinations. Such valving arrangements are susceptible to contamination, cross contamination, and low reliability. Further, where a common component, such as the heater of Gleave is employed, one failure creates a common failure.

The Art Rejections

All of the art rejections hinge on Gleave which is entitled "Automated Analytes Supercritical Fluid Extraction Apparatus", and it addresses improvements relating to the extraction of various analytes from solid matrix samples using a fluid under elevated temperatures and pressures sufficient to cause the fluid to be in a supercritical condition as addressed at col. 1, lines 20-23 and col. 2, lines 3-14, for example. As an initial matter, this is quite a different context than the "combinatorial chemical synthesis reaction tool" claimed in claims 1 and 47. This point was previously urged and has not been addressed by the Official Action. Clarification should be provided or these claims should be allowed.

As seen in Gleave's figures, it appears that a cell, such as cell 22, is brought to a single location where a fluid coupling assembly 141, as seen in Fig. 6A injects fluids. It does not appear that fluid can be injected into multiple reaction vessels or evacuated from multiple reaction vessels as advantageously taught by the present invention.

Similarly, Gleave transports a cell to a single oven location where that cell is then heated rather than heating multiple reaction vessels at the same time. Such an approach is very time consuming where large numbers of vessels are to be processed, and as noted above, a single failed component results in total machine failure.

The remaining references relied upon in the Official Action do not address Gleave's failings as a reference. Further, it would not be apparent that one would or should combine Gleave which focuses on supercritical fluid extraction with the other items which address different contexts and different problems. The claims as presently amended are not anticipated by Gleave, and are not obvious based upon Gleave taken in combination with the other items relied upon.

The Official Action specifically refers to col. 2, lines 14-16 of Panetz which indicate that it is desirable to "prepare samples for further analysis on either a batch or continuous basis." Panetz is entitled "Apparatus for Automatically separating a Compound from a Plurality of Discrete Liquid Specimens" and it is directed to "filtering or extracting constituents from solutions or solids". Col. 1, lines 11 and 12. Panetz delivers "sample preparation columns 50" into a transport disc 40. These columns 50 are best seen in Fig. 3 (side view) and Fig. 5 (top view). As discussed at col. 4, lines 24-27 of Panetz, "the term 'sample preparation column' is meant to include any form of housing having an inlet port and an outlet port with some mechanical or chemical material for removing at least one substance from a fluid passing through the column." Such "columns" do not appear to meet the presently claimed "reaction vessels", but perhaps more importantly these columns and the overall arrangement of Panetz do not meet the presently claimed injection and evacuation ports and their respective fittings. As seen in Panetz Fig. 13, reagent "is delivered from a bottom orifice 107 of reagent nozzle 105 when reagent nozzle 105 is in the DISPENSE position". Col. 6, lines 62-64. A pressure head 70 comes into play when it is desired to deliver pressurized gas. Col. 7, lines 5-8. Like Gleave (supercritical fluid extraction), Panetz (automatic separation) addresses a distinctly different context than the present invention (combinatorial chemical synthesis reaction or universal fluid exchange). Clarification on this point is also requested.

The remaining references are relied upon to pick and choose features in an improper hindsight reconstruction of the present invention. More particularly, the Official Action recognizes various deficiencies of both Gleave and Panetz as references with respect to the present claims; however, it concludes that claims 1-9, 23-29 and 47 are obvious therefrom. Among the statements made in the Official Action is the following: "With respect to the bottom

carousel fitting plate, one of ordinary skill in the art would have found it obvious to provide an additional support plate in the modified system of Gleave et al., for supporting the evacuation fittings, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art." This and other broad statements about "the art" are traversed as both unsupported and as inconsistent with the art of record. As addressed in further detail below, the Official Action cites Judd, Chang, Sugarman and Mohan as "of interest for the teaching of reaction tools having a plurality of reaction vessels." These items represent failure of others to both recognize the problems addressed by the present invention, and to solve those problems in the advantageous manner presently claims. This constitutes evidence of nonobviousness.

With respect to claims 17-22, 29 and 35-40, it is suggested that Gleave's integral heater is a teaching contrary to the proposed combination with Averette. Gleave teaches an arrangement in which each sample is rotated to a single location for heating. Gleave represents a rejection of the separate heater approach of Averette.

With respect to the references cited as of interest being evidence of the nonobviousness of the present invention, Chang typifies a serious problem associated with designs such as that shown in Chang. The multiplicity of valves in an approach such as Chang's makes such synthesizers undesirable due to contamination, cross contamination and low reliability. The present invention advantageously eliminates unnecessary valves in the solvent dispensing and evacuating lines.

Judd also illustrates two major problems with typical prior art synthesizers. Manual operation, such as for example the manual addition of liquids, nullifies any possible advantages. The very idea of practical combinatorial synthesis is the reduction as far as possible of repetitive

and time consuming steps. A second major problem of Judd is the common evacuating manifold which makes this system even less attractive.

Sugarman fails to address the goals of improving a solvent exchanger by eliminating common components, such as common filling, evacuating manifolds, common temperature control and common agitation mechanisms. As noted above, where such "common" components are employed, one failure creates a common failure. Further, valve elimination is highly desirable. The present invention is highly advantageous in this respect. Sugarman is not relevant other than as evidence of the failure of others.

Mohan is not comparable to the present claims. It has all or most of the above described problems rolled into one. It is based on totally different principles and again is relevant with respect to failure of others.

Conclusion

All of the presently pending claims, as amended, appearing to define over the applied references, withdrawal of the present rejection and prompt allowance are requested.

Respectfully submitted,

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